

At Middletown, an iron building in course of erection was blown down.

27th.—A severe gale prevailed over the north part of the Lake region. At Duluth considerable damage was done to unfinished buildings. At Trout Lake, 44 miles west of Sault de Ste. Marie, Mich., wind uprooted trees and demolished houses.

30th.—A severe storm with thunder and lightning swept

over Tiffin, Ohio, about 5 p. m. The storm, which appeared to be a straight blow, moved eastward, damaging houses, trees, etc. The wind lasted about 5 minutes and was followed by a light fall of rain. Sells Brothers circus lost about \$5,000 by damage to properties, and several of the audience and employés were injured. A man was reported killed by lightning near Stockwell, Ind.

INLAND NAVIGATION.

Heights of rivers above low-water mark, April, 1891 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<i>Red River.</i>						
Shreveport, La.	29.9	30	18.0	18, 19	13.8	4.2
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	21	17.5	10	5.2	12.3
Little Rock, Ark.	23.0	23	20.9	13	8.1	12.8
<i>Missouri River.</i>						
Sioux City, Iowa	18.7	10	10.6	8	6.0	4.6
Omaha, Nebr.	18.0	11	11.2	1	7.6	3.6
Kansas City, Mo.	21.0	15	14.5	11	9.6	4.9
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	17	6.4	1	3.2	3.2
La Crosse, Wis.	13.0	27, 28	10.4	1	8.4	2.0
Dubuque, Iowa	16.0	30	13.9	1	8.1	5.8
Davenport, Iowa	15.0	29, 30	10.0	1	6.9	3.1
Keokuk, Iowa	14.0	22	10.6	2	9.7	0.9
Saint Louis, Mo.	30.0	25	23.5	9, 10	18.1	5.4
Cairo, Ill.	40.0	6	44.8	30	31.3	13.5
Memphis, Tenn.	33.0	11, 15	33.9	30	28.0	5.9
Vicksburg, Miss.	41.0	2, 3, 4	48.1	21, 26	47.3	0.8
New Orleans, La.	13.0	2	15.8	30	15.0	0.8
<i>Ohio River.</i>						
Pittsburgh, Pa.	22.0	4	15.0	30	3.0	12.0
Parkersburg, W. Va.	38.0	4	24.8	30	6.0	18.8
Cincinnati, Ohio	45.0	7	43.5	30	15.5	28.0
Louisville, Ky.	24.0	7	18.6	30	7.9	10.7
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	4	26.4	20, 30	11.4	15.0
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	2, 3	16.3	30	6.2	10.1
Knoxville, Tenn.	29.0	13	9.2	30	2.7	6.5
<i>Monongahela River.</i>						
Pittsburgh, Pa.	29.0	4	15.0	30	3.0	12.0
<i>Savannah River.</i>						
Augusta, Ga.	32.0	3	23.5	30	9.4	14.1
<i>Willamette River.</i>						
Portland, Oregon	15.0	27, 28	8.8	4	2.6	6.2

ICE IN RIVERS AND HARBORS AND OPENING OF NAVIGATION.

Mississippi River.—At La Crosse, Wis., the river was clear of floating ice until 6.30 p. m. of the 1st, when it came down in great fields, doing considerable damage to the new sheer work of the new bridge. At Red Wing, Minn., the river was free of ice on the 5th. On the 10th ice on Lake Pepin was considerably broken up by high winds. Reports of the 16th indicated that the ice on Lake Pepin was sufficiently broken up to allow the passage of steamboats. On the 12th the first up-river boat of the season arrived at La Crosse, Wis.

Missouri River.—The ice gorge below Fort Buford, N. Dak., broke during early morning of the 1st. On the 4th navigation opened at Scranton, N. Dak. Ice was running out until the 4th, and on the 5th the river was clear of ice at that point. On the 3d the ice broke up at Bismarck, N. Dak., at 4 a. m. In the last 46 years the earliest date on which the ice was broken up at Bismarck was March 3d, 1871, and the latest date was April 21st, 1859. At Pierre, S. Dak., the earliest date upon which ice was broken up in the last 46 years was March 11th, 1873, and the latest date was April 20th, 1847. At Fort Yates, N. Dak., the ice was breaking up and moving out on the 4th. At Fort Sully, S. Dak., the river began filling up with broken ice on the 5th; 6th, river full of running ice; 26th, the first boat of the season going south; 29th, the first boat of the season going north. On the 10th the river was clear of ice at Yankton, S. Dak. On the 10th the river rose very rapidly at Sioux City, Iowa, with a large amount of drift and but little ice.

Saint Clair River.—On the 3d the Saint Clair River was closed by ice 12 miles south of Port Huron; 8th, large quantities of floating ice passing Port Huron; 9th, Saint Clair

River blocked with ice from Marysville to Saint Clair, a distance of 12 miles; 13th, ice from lake was filling up the river at Port Huron, and the steamer "Atlantic," which left Detroit on the 12th, was reported fast in the ice at Olgonac; 14th, river completely blocked by ice at Port Huron, and ferry-boats were unable to run; this condition never before existed at that place at this season of the year; 16th, the ice in the river was slowly breaking up at Port Huron.

Lake Champlain was opened for navigation at Plattsburgh Barracks, N. Y., on the 4th. At Burlington, Vt., navigation was resumed on the 9th. Navigation on Lake Ontario opened at Oswego, N. Y., on the 4th. At Buffalo, N. Y., ice was drifting down the Niagara River in large fields on the 2d; 5th, harbor clear of ice; 10th, lake entirely free of ice; 14th, navigation opened; 16th, the first boat of the season left. Navigation on Lake Erie opened at Erie, Pa., on the 11th; at Toledo, Ohio, on the 5th, and at Sandusky, Ohio, on the 7th. On the 9th Lake Huron was covered with ice as far as could be seen from Port Huron, Mich. On the 19th a steamer from Lake Michigan arrived at Duncan City, Mich.; this was the first boat of the season. At Sault de Ste. Marie, Mich., the first boat of the season, a tug, bound from Detroit for Ashland, arrived on the 27th. At Duluth, Minn., navigation opened on the 30th. Since 1880, the earliest date on which navigation opened at Duluth, was March 25th, 1889, and the latest date was May 9th, 1883. The first boat of the season from Milwaukee, Wis., arrived at Green Bay on the 13th. The first boat of the season left Port Huron, Mich., on the 19th, and Fort Gratiot Light was lighted for the first time this season. On the 20th a steam barge arrived at Port Huron from Oscoda, Mich.; this was the first arrival of the season. On the 23d vessels that had been ice bound at Saint Clair Flats forced their way through, opening navigation for the season. At Port Huron navigation opened 25 days later than last year. The first boat of the season from Bay City, Mich., arrived at Alpena on the 19th. Lake Winnebago was opened at Oshkosh, Wis., on the 21st.

FLOODS.

The month opened with the Mississippi River above the danger-line from Cairo, Ill., southward; it continued above the danger-line at Cairo until the 19th; at Memphis, Tenn., until the 22d; and at Vicksburg, Miss., and New Orleans, La., throughout the month.

On the 1st the Mississippi River was rising rapidly at Arkansas City, Ark. On the 2d the stage of the water was 48.1 feet, 7.1 feet above the danger-line, at Vicksburg, Miss., and 15.8 feet, 2.8 feet above the danger-line, at New Orleans, La. On the 3d the Concord crevasse was 1,000 feet in width. The river remained stationary at 48.1 feet at Vicksburg, Miss. A break occurred about 2 miles below Longwood, Miss. On the 4th the river remained stationary at 48.1 feet at Vicksburg, Miss. On the 5th a portion of the newly constructed levee which was built to protect Gretna from the overflow from the Ames crevasse gave away, and in a few hours the entire rear portion of the town was flooded, and much damage and inconvenience resulted. On the 6th the stage of the water at Cairo, Ill., was 44.8 feet, 4.8 feet above the danger-line. On the 10th water from the Ames crevasse broke through the rear protection levee on the Concession Plantation, 20 miles below New Orleans, and it was feared that great damage would be done

to the growing sugar crop. From the 11th to 15th the stage of the river at Memphis, Tenn., was 33.9 feet, 0.9 foot above the danger-line. Large quantities of driftwood were reported in the Red River at Shreveport, La., from the 25th to 29th. Melting snow in the mountains in north-central New Mexico and south Colorado caused the Rio Grande Del Norte River

and other streams in that region to rise rapidly at the end of the month. At El Paso, Tex., the Rio Grande River was the highest ever known at that season of the year. High water was also reported in the Brazos River in Texas. Serious damage was reported in the Chaudiere Valley, Que., by a rise in the Chaudiere River on the 18th.

MISCELLANEOUS PHENOMENA.

☉ DROUGHT.

Very dry weather prevailed in the south Atlantic and east Gulf states. In west Maryland, and over a great part of North Carolina, the month was too dry for farming operations. In Mississippi cotton was injured, and in Louisiana all crops suffered from drought.

☉ FOREST FIRES.

At the close of the month fires were raging in the mountains near Cumberland, Md., and extensive forest fires prevailed near Blue Knob, Reading, and Ashland, Pa., and Egg Harbor City, May's Landing, and Tom's River, N. J. Extensive forest fires near East Hampton, Long Island, had been subdued.

☉ SUN SPOTS.

Haverford College Observatory, Pa. (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.		
April, 1891.										
5, 9 a. m.	0	0	0	0	0	0	1	15	2	Definition fair; 1 large spot.
6, 10 a. m.	0	0	0	0	0	0	1	1	1	Definition fair.
7, 10 a. m.	1	4	0	0	0	0	2	6	2	Definition good; 1 large spot.
8, 12 m.	0	0	0	0	0	0	1	1	1	Definition good.
9, 12 m.	1	8	0	0	0	0	2	9	1	Definition fair.
12, 3 p. m.	1	10	1	1	0	0	2	18	1	Definition fair.
13, 9 a. m.	2	5	0	0	0	0	3	14	2	Definition fair.
14, 9 a. m.	0	18	0	0	0	0	3	32	1	Definition good.
15, 9 a. m.	0	9	0	0	0	0	3	37	2	Definition good.
16, 9 a. m.	2	6	0	0	0	0	4	29	2	Definition poor.
17, 9 a. m.	0	18	0	0	0	0	3	40	2	Definition good.
19, 9 a. m.	1	2	0	0	0	0	5	32	3	Definition good.
20, 11 a. m.	0	0	1	7	0	0	3	22	1	Definition poor.
21, 10 a. m.	1	23	0	0	0	0	4	32	1	Definition good; 1 large spot.
22, 10 a. m.	1	6	0	0	0	0	5	36	2	Definition good; 2 large spots.
23, 10 a. m.	0	59	0	0	0	0	3	92	1	Definition fine; 1 large spot.
24, 10 a. m.	0	0	0	0	0	0	3	62	1	Definition fair.
25, 10 a. m.	0	0	0	6	0	0	3	41	3	Definition good.
26, 10 a. m.	2	4	1	3	0	0	4	34	4	Definition fair.
27, 10 a. m.	1	8	1	10	0	0	4	52	...	Definition fine; 2 large spots.
28, 9 a. m.	0	11	0	0	0	0	4	58	1	Definition fine; 1 large spot.
29, 9 a. m.	0	0	0	0	0	0	3	25	1	Definition fair.
30, 10 a. m.	0	0	0	0	0	0	3	26	1	Definition fine.

Mr. D. E. Hadden, Alta, Iowa: 4th, 1 group, 4 spots; large spot with umbra and penumbra on meridian; faculæ by rotation on e. limb. 5th, 1 group, 2 spots. 6th, 1 group, 1 spot. 7th, 1 group, 1 spot; aurora in evening (area by rotation e. limb of faculæ of 12th of March). 8th, 1 group, 1 spot. 10th, 1 group, 12 spots; group s. latitude, about 1 day w. of meridian; group faculæ by rotation se. limb. 11th, 1 group, 8 spots; small group of faculæ by rotation e. limb. 12th, 1 group 6? spots; small group of faculæ by rotation se. limb. 14th, 1 group, 9 spots. 15th, 1 group, 10 spots; small group faculæ by rotation; faculæ on nw. and w. limbs disappearing by rotation. 16th, 1 group, 9 spots; faculæ by rotation e. limb. 17th, 2 groups, 14 spots; new group se. 18th, 2 groups, 8 spots?; group on nw. limb disappearing by rotation. 19th, 2 groups. 22d, 3 groups, 18 spots; new group 2 days in on e. limb in large area faculæ; 2 large spots, with umbra and penumbra; faculæ ne. by rotation 1 day in. 23d, 3 groups, 28 spots; large spot had "bridge" across it. 24th, 3 groups, 30 spots; a group disappearing by solar rotation w. 25th, 2 groups, 24 spots; group faculæ by rotation on e. limb; large group very elongated. 26th, 3 groups, 23 spots; new group near meridian, n. latitude; the umbra in large spot in group s. latitude had divided into 2 portions; group with faculæ on w. limb disappearing by rotation; large area faculæ on e. limb. 27th, 4 groups, 26 spots; faculæ by rotation on e. limb. 28th, 4 groups, 12 spots; large spot s. latitude; umbra again united. 30th, 2 groups, 6 spots.

Mr. John W. James, Riley, Ill.: 1st, 1 small spot 2 days w. of meridian in n. latitude; 1 small group 2 days w. of meridian in s. latitude. 4th to 8th and 10th, only the large spot of March 29th seen; this disappeared on w. edge, 10th. 10th, 1 new spot and 1 new group near sun's centre. 16th, 2 new groups 2 days from w. edge. 19th and 20th, none seen. 21st, 2 new spots on e. edge. 23d, 2 new groups 3 days from w. edge. 24th, immense areas of faculæ near w. limb; counted 30 spots in all. 26th, part of the group of the 21st formed into 1 large spot on sun's meridian, estimated 26,450 miles in diameter. 27th, 1 new group; 1 of its spots 13,000 miles in diameter; it formed in 21 hours 3 days from w. edge, and disappeared by solar rotation on the 30th, leaving only 1 large spot visible.

Mr. H. D. Govey, North Lewisburgh, Ohio: sun spots were reported on the 1st, 5th, 7th, 8th, 12th, 16th, 17th, 21st, and 25th to 30th.

☉ ATMOSPHERIC ELECTRICITY.

☉ AURORAS.

Auroras were reported as follows: 1st, Bar Harbor and Eastport, Me.; Berlin Mills, N. H. 3d, Somerset, Mass. 6th, Sycamore, Ill.; Glasgow, Wis. 7th, Canton, Conn.; Oswego and Riley, Ill.; Alta, Cresco, Hopeville, and Stilson, Iowa; Caldwell, Lansing, Marquette, Rockland, and Rochester, Mich.; Choteau, Mont.; Hassan, Ohio; Eagle's Mere, Pa.; Webster, S. Dak.; Embarrass, Harvey, Hayward, Meadow Valley, and Medford, Wis. 8th, New Hartford and Southington, Conn.; Amherst, Cambridge, and Florida, Mass.; Detroit, Marquette, and Sault de Ste. Marie, Mich.; Ithaca, N. Y.; Eagle's Mere and Greenville, Pa.; Block Island, R. I.; Harvey, Wis. 9th, Eastport and Kent's Hill, Me.; Hassan, Ohio. 10th, Orono,

Me.; Hassan, Ohio. 11th, Hassan, Ohio; Glasgow, Harvey, and Hayward, Wis. 12th, Leicester, Mass.; Rochester and Sault de Ste. Marie, Mich.; Demos and Hassan, Ohio; Block Island, R. I. 13th, Berlin Mills, N. H.; Grampian Hills, Pa.; Wolsey, S. Dak. 15th, Webster City, Iowa. 18th, Amherst, Mass. 22d, Sandwich, Ill. 23d, Berlin Mills, N. H. 25th, Angola, Ind. 26th, Oregon, Mo. 27th, Greenville, Pa.; Medford, Wis. 28th, Voluntown, Conn.; Sycamore, Ill.; Eastport, Farmington, Kent's Hill, and Portland, Me.; Cambridge, Mass.; Hayward and Peshtigo, Wis. Sanborn, Iowa; Greenville, Pa. On the 7th, 8th, and 28th auroras were reported over the northern part of the country from New England to Wisconsin.

Detroit, Mich., 8th: a well-defined aurora extending over